

BOTANICAL DESCRIPTIONS, ETHNOMEDICINAL AND NON-MEDICINAL USES OF THE GENUS *ARTABOTRYS* R.BR.

KOK KWAN TAN* AND CHRISTOPHE WIART

School of Pharmacy, Faculty of Science, The University of Nottingham Malaysia Campus, Jalan Broga, 43500 Semenyih, Selangor Darul Ehsan, Malaysia. Email: khyx1tkk@nottingham.edu.my, tkk20118@yahoo.com.sg

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ABSTRACT

Being as one of the largest genera of the family Annonaceae, *Artabotrys* encompasses more than 100 species of woody climbers and scandent shrubs. Many species of this genus have been traditionally used for different human ailments, in particular for the treatment of malaria, scrofula and cholera. Apart from medicinal purposes, they are used in perfumery, beverage making and as fodder. This review shows the great diversity of *Artabotrys* species in both medicinal and non-medicinal applications.

Keywords: Botanical descriptions, Ethnomedicinal, Non-medicinal, *Artabotrys*

INTRODUCTION

Artabotrys R.Br. (*Arta*:- to suspend; *-botrys*: a bunch of grapes) [1–3] is one of the largest genera of the custard-apple family, Annonaceae Juss. [4–7]. The genus *Artabotrys* comprises over 100 species of woody climbers and scandent shrubs [8–10] distributed mainly in tropical and subtropical regions of the world [11,12], especially tropical Africa and Eastern Asia [13–18]. In this review article, we summarise the botanical descriptions of *Artabotrys* species as well as their ethnomedicinal and non-medicinal uses.

BOTANICAL DESCRIPTIONS

Generally, the leaves are simple, alternate [19] or opposite [20], coriaceous [21], glabrous or glabrescent [22], glossy [23] and petiolate [19]. Accessory buds in the axils of leaves on the orthotropic shoots can either grow out vegetatively as plagiotropic shoots, form thorns especially in shady conditions, or develop into sympodial inflorescences, with each sympodial unit terminating in a hook [9][24,25].

The flowers are white or yellow [21], highly fragrant [26], hermaphrodite [19] or unisexual [22], solitary or in fascicles [27], and borne on woody, often stout [23], and almost invariably more or less sharply hooked peduncles, which are often leaf-opposed or opposite to lateral branches [22]. The three sepals are valvate [19], and free [20] or variably united at the base [28]. The six petals are valvate [23], in two whorls of three each [29], subequal [30], free, concave at the base [22], and connivent over the stamens and carpels [31]. The stamens are numerous [32], closely packed [28], quadrate-oblong [22] or cuneate [27], and have a truncate dilated connective apex [20]. The carpels are numerous [33], oblong or oval [23], and contain two basal ovules in the ovary [34].

The fruits consist of monocarps that are cylindrical or ellipsoid, mostly sessile [20], indehiscent [19], and one- or two-seeded [22]. The seeds are oblong [19], collateral [34], erect [35], and without aril [36].

ETHNOMEDICINAL USES

Artabotrys species have a long history of traditional use for a wide range of medical conditions, particularly malaria [37], scrofula [16] and cholera [38]. Table 1 lists the applications of *Artabotrys* species as folk medicines for the treatment of various ailments in different countries.

According to the habitual remedies practised by local communities, roots are the most commonly used plant parts, followed by leaves, stems, flowers and fruits. Prior to administration, majority of the plant remedies are prepared as decoction and infusion by using single plant parts or in combination with different plant parts or species. The utilisation of more than one plant species in the preparation of remedies could be attributed to their synergistic effects that they could have during ailment treatment [39]. With respect to the mode of administration, most of the preparations are taken orally whereas some are applied topically either as bath or massage.

NON-MEDICINAL USES

In addition to their medicinal applications, *Artabotrys* species are employed in the manufacture of perfumes due to the fragrance of the flowers [40]. These aromatic flowers are also used as flavouring agents [41] as well as for making stimulating tea-like beverages [42]. Furthermore, both leaves and fruits of *Artabotrys* species are utilised as animal feeds, predominantly for cattle [19], chimpanzees [43] and goats [44]. Other non-medicinal uses of different plant parts of *Artabotrys* species are shown in Table 2.

CONCLUSION

This review reflects the great diversity of different plant parts of *Artabotrys* species used for medicinal purposes as well as other non-medicinal applications.

Table 1: Ethnomedicinal uses of *Artabotrys* species.

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. aurantiacus</i>	Not specified	Treatment of diabetes	Congo Basin Forest, DR Congo, Central Africa	[45]
<i>A. brachypetalus</i>	Roots	Remedy for abdominal pains during pregnancy (mush; orally)	Muda, Mozambique, Southeastern Africa	[46]
		Remedy for abdominal troubles (mixed with roots of <i>Combretum erythrophyllum</i> , <i>Cyperus sexangularis</i> and <i>Salix mucronata</i> , stems of <i>Phragmites mauritianus</i> , and sedges)	Venda, Southern Africa	[47]
		Remedy for asthma and cough	Machava and Massingir, Mozambique, Southeastern Africa	[48]

		Remedy for pelvic pains and stomach troubles (decoction with stem barks of <i>Parinari curatellifolia</i> subsp. <i>mobola</i> and <i>Rauvolfia caffra</i> to prepare soft porridge for older people)	Venda, Southern Africa	[47]
		Remedy for women with physical defects (mixed with roots of <i>Garcinia livingstonei</i> and <i>Heteropyxis natalensis</i>)		
		Treatment of convulsions (infusion; orally)	Malawi, Southeastern Africa	[49,50]

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. brachypetalus</i>	Roots	Treatment of female infertility, food poisoning, general weakness, intestinal worms, snake bites, stomach ache and venereal diseases (maceration; orally)	Manica, Mozambique, Southeastern Africa	[46]
		Treatment of impotence (powdered with roots of <i>Garcinia livingstonei</i> and <i>Securidaca longipedunculata</i> , and added to sorghum beer; orally)	Venda, Southern Africa	[47] [51,52]
		Treatment of infertility (maceration with roots of <i>Antidesma venosum</i> , <i>Dichrostachys cinerea</i> subsp. <i>africana</i> and <i>Zantedeschia aethiopica</i> ; orally twice daily for one week, or decoction with roots of <i>Berchemia discolor</i> , <i>Capparis tomentosa</i> , <i>Cassytha filiformis</i> , <i>Maerua caffra</i> , <i>Osyris lanceolata</i> , <i>Sphedamnocarpus galphimiiifolius</i> subsp. <i>galphimiiifolius</i> and <i>Sphedamnocarpus pruriens</i> to prepare soft porridge; orally for one week)		
		Used as aphrodisiac (mixed with root barks of <i>Acacia ataxacantha</i> and <i>Wrightia natalensis</i> , and barks of <i>Albizia versicolor</i>)	Venda, Southern Africa	[47]
		Used as aphrodisiac and stimulant (infusion)	Southern Africa	[53]

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. brachypetalus</i>	Roots	Used to improve health of babies (decoction with roots of <i>Cardiogyne africana</i> , <i>Celosia</i> spp., <i>Ficus platyphylla</i> and <i>Senna petersiana</i> to make tea)	Maputo, Mozambique, Southeastern Africa	[54]
		Used to keep baby's stomach in good condition and cleanse the blood (infusion with roots of <i>Albizia brevifolia</i> , <i>Annona senegalensis</i> , <i>Bauhinia galpinii</i> , <i>Carissa edulis</i> , <i>Cassine</i> spp., <i>Crotalaria</i> spp., <i>Diospyros lycioides</i> , <i>Hippocratea</i> spp., <i>Maytenus senegalensis</i> , <i>Piliostigma thonningii</i> , <i>Rhoicissus tridentate</i> , <i>Sansevieria hyacinthoides</i> and <i>Terminalia sericea</i> , root barks of <i>Ficus sycomorus</i> and <i>Syzygium cordatum</i> , barks of <i>Acacia alba</i> and <i>Syzygium guineense</i> , and fruits of <i>Gardenia volkensii</i> to prepare soft porridge for baby)	Venda, Southern Africa	[47]
<i>A. grandifolius</i>	Root barks	Treatment of gonorrhoea (concoction)	Tanzania, Eastern Africa	[55]
	Flowers	Used as cardiogenic (decoction)	Krabi and Pattani, Southern Thailand	[56,57]
	Not specified	Treatment after childbirth	Jerantut, Pahang, Malaysia	[58]

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. hainanensis</i>	Not specified	Treatment of malaria and scrofula	Hainan, Southern China	[59] [11][60]
		Used as analgesic, antidotal, antiphlogistic and antipyretic		
<i>A. harmandii</i>	Roots and stems	Used as lactagogue	Chaiphaphum and Yasothon, Northeastern Thailand	[56]
	Stems	Remedy for body pains (decoction; orally)	Chanthaburi, Eastern Thailand	[61]
	Not specified	Used to promote lactation in breastfeeding women (powdered with <i>Albizia myriophylla</i> , <i>Alyxia reinwardtii</i> , <i>Amaranthus spinosus</i> , <i>Amomum testaceum</i> , <i>Artemisia</i>)	Thailand	[62]

annua, Cinnamomum porrectum, Cinnamomum verum, Cyperus rotundus, Dryobalanops aromatica (borneol), Euphorbia hirta, Oenanthe stolonifera, Syzygium aromaticum, Tarenna hoensis, Tinospora tomentosa, Xantolis cambodiana and Zingiber officinale)

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. hexapetalus</i>	Roots and leaves	Remedy for abdominal and kidney pains (decoction with roots of <i>Uvaria leptocladon</i>)	Korogwe, Tanzania, Eastern Africa	[63]
	Roots and fruits	Treatment of malaria and scrofula	Southern China	[19][27] [64-72]
	Leaves	Treatment of cholera (decoction)	Hazaribagh, Jharkhand, Eastern India; Malay Archipelago; Philippines	[10][19] [27][38] [71][73]
	Flowers	Treatment of itching	Southern India	[74]
		Treatment of bad breath, biliousness, bladder diseases, blood and heart diseases, headache, itching, leucoderma, sweating, thirst and vomiting	India	[19][73]
Not specified	Used as cardiogenic Used as cardiac stimulant, muscle relaxant and uterine stimulant	Thailand Bangalore, Karnataka, Southwestern India	[56] [75,76]	

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. modestus</i>	Roots	Remedy for diarrhoea and stomach ache (decoction)	Kenya and Tanzania, Eastern Africa	[55][77]
		Remedy for spiritual ailments (decoction)	Duruma, Kenya, Eastern Africa	[78]
		Remedy for stomach ache	Tanzania, Eastern Africa	[79]
	Leaves	Treatment of nausea and vomiting (infusion)	Kenya and Tanzania, Eastern Africa	[55][77]
<i>A. monteiroae</i>	Roots	Remedy for backache, diarrhoea and stomach ache (decoction)	Kenya, Eastern Africa	[80]
	Roots and barks	Treatment of malaria (decoction; orally)	Tanzania, Eastern Africa	[81]
<i>A. oblanceolatus</i>	Leaves	Treatment of malaria (decoction; bathing)		
	Roots and stems	Used as lactagogue	Chaiyaphum, Northeastern Thailand	[56]

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. odoratissimus</i>	Roots	Treatment of malaria	Thiruvannamalai, Tamil Nadu, Southern India	[37][82]
	Roots and fruits	Treatment of malaria and scrofula	China	[17][83]
	Stems	Treatment of malaria	Kandal, Cambodia	[84]
	Leaves	Treatment of cholera (decoction)	Malay Archipelago; Malwa, Central India;	[37][82] [85-91]
	Flowers	Treatment of bad breath, biliousness, bladder diseases, blood and heart diseases, headache, itching, leucoderma, sweating, thirst and vomiting	India	[87,88] [92]
		Fruits	Treatment of topical fungal infection	Assam, Northeastern India
<i>A. pallens</i>	Not specified	Used as emmenagogue and stimulant	Malay Archipelago	[85]
	Stem woods	Treatment of gastritis (decoction with parasitic plant of <i>Buab lum</i> and whole plant of <i>Mak dai bai</i> ; orally)	Bolikhamsai, Laos	[93]
<i>A. pilosus</i>	Root, stems and leaves	Treatment of malaria and scrofula	Hainan, Southern China	[94]

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. rhopalocarpus</i>	Saps	Used as aphrodisiac (orally)	Mount Cameroon, Central Africa	[95,96]
<i>A. siamensis</i>	Flowers	Used as cardi tonic	Thailand	[56]
<i>A. spinosus</i>	Stem barks	Remedy for venereal diseases	Ubon Ratchathani, Northeastern Thailand	[56]
<i>A. stenopetalus</i>	Saps	Used as aphrodisiac	Zaire, Central Africa	[97]
	Twigs	Used as part of a prescription for the promotion of conception		
<i>A. suaveolens</i>	Leaves	Treatment of enlarged spleen (orally)	Philippines	[19][98]
	Roots and barks	Used as emmenagogue, and to relieve fatigue after childbirth (decoction; orally)		
	Leaves	Treatment of cholera (decoction or infusion; orally)	India; Java, Indonesia	[19][85][98,99]

Table 1: Ethnomedicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Ethnomedicinal use	Region	Reference
<i>A. uncinatus</i>	Roots	Treatment of malaria	Southern China; Taiwan	[16][55][100-106]
	Barks	Remedy for gastrointestinal diseases (toasted; massaging)	Hainan, Southern China	[107]
	Leaves	Treatment of cholera (decoction)	Malay Archipelago	[108]
	Fruits	Treatment of scrofula	Southern Taiwan	[16][104]
	Whole plant	Treatment of hepatocarcinoma	Taiwan	[109]
	Not specified	Treatment of glandular swellings	Taiwan	[55]
<i>A. zeylanicus</i>	Flowers	Treatment of nasopharyngeal carcinoma		[110]
		Treatment of vomiting (decoction)	Kerala, Southwestern India	[111]
<i>Artabotrys</i> sp.	Roots	Remedy for constipation and joint pains (decoction; orally)	Gombak, Selangor, Malaysia	[112]
	Not specified	Treatment of open sores	Chiang Rai, Northern Thailand	[113]
		Used as stimulant	Madagascar	[49]

Table 2: Non-medicinal uses of *Artabotrys* species.

Plant species	Part used	Non-medicinal use	Region	Reference
<i>A. brachypetalus</i>	Stems	Used for roof and courtyard wall construction	Venda, Southern Africa	[47]
	Fruits	Used for beverage making	Limpopo, Southern Africa	[114]
	Woods	Used to make household utensils and music instruments	Mutare, Zimbabwe, Southern Africa	[115]
	Not specified	Used as feeds for goats	Inhambane, Mozambique, Southeastern Africa	[44]
<i>A. hexapetalus</i>	Flowers	Used as flavouring in tea	Southern India; Sri Lanka	[41]
		Used in perfumery as the source of essential oils	Salem, Tamil Nadu, Southern India	[19][42]
		Used to prepare stimulating tea-like beverages		
	Whole plant	Used as ornamental plants	Jajpur, Odisha, Southeastern India	[116]
		Used for screen planting in large gardens	Java, Indonesia; Philippines; Southern China	[19]

Table 2: Non-medicinal uses of *Artabotrys* species (continued).

Plant species	Part used	Non-medicinal use	Region	Reference
<i>A. monteiroae</i>	Fruits	Used as feeds for chimpanzees	Mahale Mountains and Ugalla, Tanzania, Eastern Africa	[43][117]
<i>A. odoratissimus</i>	Flowers	Used in perfumery as the source of essential oils	Coimbatore, Tamil Nadu, Southern India	[40]
<i>A. scytophyllus</i>	Flowers	Used as flavouring and spices for sauces	Madagascar; Southeastern Asia	[41]
<i>A. speciosus</i>	Fruits	Used to make head and neck garlands	Andaman Islands	[118]

<i>A. suaveolens</i>	Stems	Used as water substitutes	Kuala Pilah, Negeri Sembilan, Malaysia	[119]
	Leaves	Used as feeds for cattle	Bali, Indonesia	[19]
	Whole plant	Used as living fences		
<i>A. thomsonii</i>	Stem saps	Used as water substitutes	Tshopo, DR Congo, Central Africa	[120]
<i>A. uncinatus</i>	Flowers	Used to scent oil	Tonga	[121]

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